

Remarks:

Prior to entry of this amendment, claims 1-5, 7-21, 25, 26 and 33-36 remained pending in the application.

Claims 1-5, 7-21, 25, 26 and 33-36 stand rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 10-11, 13 and 16 stand rejected under 35 U.S.C. §102(b) as being anticipated by Taylor et al. (J. Appl. Phys. 64 (5)); claims 15 and 36 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Taylor et al., claims 10-11, 13 and 16 stand rejected under 35 U.S.C. §102(e) as being anticipated by Brennen et al. (U.S. Patent Publication No. 2005/0242059 \equiv U.S. Patent No. 6,919,162), claims 1-5, 7-8, 10-16, 18-20, 33 and 36 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Brennen et al., optionally in view of Taylor et al., claims 10-11, 13 and 16 stand rejected under 35 U.S.C. §102(e) as being anticipated by Burns et al. (U.S. Patent No. 5,172,473); claims 1-5, 7-8, 10-16 and 18-20 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Burns et al., optionally in view of Taylor et al.; and claims 9, 17, 21, 25-26 and 34-35 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Brennen et al, optionally in view of Taylor et al. as applied to claims 1-5, 7-8, 10-16, 18-20, 33 and 36, and further in view of Murthy et al. (U.S. Patent No. 6,120,131).

Page 11 - RESPONSE TO OFFICE ACTION
Serial No. 10/052,815
HP Docket No. 10012053-1
KH Docket No. HPCC 321

Applicants respectfully traverse these rejections. However, to facilitate prosecution, applicants have amended the pending claims to clarify the claimed subject matter and to further distinguish the claims from the cited prior art. In view of these amendments and the remarks below, applicants request reconsideration of the application under 37 C.F.R. §1.111, and allowance of the pending claims.

Objections Based on Informalities

Applicants have corrected the misspelling of "excimer" on page 15 of the application, and wish to thank the Examiner for bringing this typographical error to their attention. Applicants also have amended page 6 of the application to make clear that the term "adhesive" as defined in the specification does not include all deposited material that, in the words of the Examiner, "does not fall off the substrate" (OA, p. 2), but only deposited material that *provides or promotes adhesion* between itself and the substrate. Finally, applicants have amended claim 1 to show the deletion of the word "a" before "the substrate" with double brackets. Applicants wish to thank the Examiner for pointing out this oversight.

Rejections Under 35 U.S.C. §112

Claims 1-5, 7-21, 25, 26 and 33-36 stand rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. With regard to the term "an initiator," applicants respectfully disagree that the scope of things intended to be encompassed by this term is unclear, and submit that a rejection on this basis is inappropriate because the application allows a person having ordinary skill in the art to

Page 12 - RESPONSE TO OFFICE ACTION
Serial No. 10/052,815
HP Docket No. 10012053-1
KH Docket No. HPCC 321

determine this scope. "If the scope of the claimed subject matter can be determined by one having ordinary skill in the art, a rejection using this form paragraph would not be appropriate." *MPEP* § 706.03(d).

Specifically, applicants note that "initiator" is defined at page 9, lines 24-29 of the application, which states "initiators 56 shield or shadow discrete portions 58 of the surface of substrate 36 . . . and thus, 'initiate' the formation of structures on the surface of the substrate." The application further provides several examples of initiators contemplated by the inventors, in particular that "initiators 56 may be intrinsic particles mixed within the substrate or nonhomogeneities within the material, particles deposited on the surface of the substrate or particles redeposited on the substrate as a result of the ablation process" (p. 11, lines 10-13). Applicants submit that this language is sufficient to allow a person of ordinary skill in the art to determine the scope of the term "initiator" in the claims. However, to further clarify the claim language, applicants have amended claims 1 and 21 to remove the language "precursors of structures" that the Examiner found unclear. Thus, the relevant portion of claim 1 now recites "providing an initiator to a substrate," and the relevant portion of claim 21 now recites "shadowing a portion of the surface of the first component with ablation debris".

The Examiner noted that the body of several of the independent claims is not commensurate in scope with the preamble of the claim due to the fact that the "applying" step may be performed prior to the other steps, inconsistent with the preamble language "preparing a surface for adhesion." In response, applicants have clarified the claim language by adding the feature that the adhesive be applied after

Page 13 - RESPONSE TO OFFICE ACTION
Serial No. 10/052,815
HP Docket No. 10012053-1
KH Docket No. HPCC 321

formation of structures (claims 1, 10, 18, and 21), and have further clarified claims 1, 10, and 18 by changing the preamble language to "a method of creating a bond between a substrate and an adhesive" (claims 1 and 10), and "a method of bonding an adhesive to a substrate" (claim 18).

With regard to applicants' use of the terms "shadow" and "non-shadowed portion," applicants believe these terms to have clear meanings in both the specification and the claims. Standard definitions of the verb form of "shadow" include, for example, "to screen or protect from light, heat, etc.; shade" and "to overspread with shadow; shade," whereas the commensurate noun form of "shadow" may be defined as "[a]n area that is not or is only partially irradiated or illuminated because of the interception of radiation by an opaque object between the area and the source of radiation." *The American Heritage Dictionary of the English Language, Fourth Edition*. Based on these and other standard definitions of "shadow," applicants submit that contrary to the Examiner's assertion, the term "shadow" does not necessarily imply space between the shadowing and shadowed objects, but merely that the shadowing object at least partially screens or protects the shadowed object from incoming radiation. Consequently, "non-shadowed portion" simply means a portion that is unscreened or unprotected from such radiation. Because applicants' use of the terms "shadow" and "non-shadowed portion" in the pending application is consistent with the above standard definitions, applicants believe their use of these terms is clear and unambiguous.

Page 14 - RESPONSE TO OFFICE ACTION
Serial No. 10/052,815
HP Docket No. 10012053-1
KH Docket No. HPCC 321

With regard to the Examiner's statement that claims 18 and 21 are vague and indefinite because they include relative terms that lack clear metes and bounds, applicants have amended each of those claims to clarify their meaning. Specifically, claim 18 has been amended to remove the preamble language "a method of increasing adhesion of an adhesive to a substrate" and to replace it with "a method of bonding an adhesive to a substrate." Additionally, claim 21 has been amended to replace the adjectives "high" and "low" with "higher" and "lower" as suggested by the Examiner.

The Examiner's statement that the claim 10 preamble "a method of preparing a surface for adhesion" is only intended use with no patentable significance is now moot, both in light of applicants' amendment of the preamble to read "a method of creating a bond between a substrate and an adhesive," and in light of applicants' amendment of the body of claim 10 to include the feature "applying an adhesive to the surface of the substrate after formation of the structures."

The Examiner noted that claim 10 includes two steps of "directing laser radiation towards the surface of the substrate" and stated that it is unclear whether these are different steps due to the lack of temporal order specified in the claim. To clarify this, applicants have amended claim 10 to include "first" and "second" steps of "directing laser radiation towards the surface." Additionally, applicants have amended claim 10 so that the step of resettling the ablation debris occurs after the "first step of directing . . .," and so that the "second step of directing . . ." occurs after the step of resettling the ablation debris. Therefore, the "second step of directing . . ." now must occur after the "first step of directing . . ." To remove any possible remaining ambiguity from claim 11,

Page 15 - RESPONSE TO OFFICE ACTION
Serial No. 10/052,815
HP Docket No. 10012053-1
KH Docket No. HPCC 321

applicants have amended that claim to specify that the step of providing an initiator occurs prior to the "first step of directing"

Regarding claim 13, the Examiner noted a lack of proper antecedent language. Applicants assume this comment relates to the language "determining *the* desired size, shape and density of structures" (emphasis added). In response, applicants have amended claim 13 to replace "determining the desired size . . ." with "determining a desired size"

Similarly, the Examiner noted a possible lack of antecedent requirements and/or temporal language in claim 18 that could lead to ambiguity. In response, applicants have amended claim 18 to distinguish formation via ablation of "a first amount of ablation debris" prior to further ablating the surface and progressively covering the surface with "a second amount of ablation debris," with the step of adjusting the fluence of the laser occurring in between the two ablation steps. Applicants believe this removes any ambiguity as to the meaning of claim 18.

Finally, the Examiner noted possible ambiguities in claim 19, specifically as to whether the last step of ablating acts on the structure previously defined in the claim, or alternatively if the step of ablating forms those structures. In response, applicants have amended claim 19 to be consistent with the amendments to claim 18 described above, to clarify that the surface of the substrate is "increasingly covered with ablation debris" and to clarify that an uncovered portion (which, since the substrate is "increasingly covered," is decreasing in size) is ablated to form structures on the surface. Thus, in claim 19, the last step of ablating acts on the uncovered portion of the increasingly

Page 16 - RESPONSE TO OFFICE ACTION
Serial No. 10/052,815
HP Docket No. 10012053-1
KH Docket No. HPCC 321

covered surface. In conjunction with the claim 18 amendment combining the steps of "further ablating" with "progressively covering," applicants believe that claim 19 is now unambiguous.

Rejections Under 35 U.S.C. §102

Claims 10-11, 13 and 16 stand rejected under 35 U.S.C. §102(b) as being anticipated by Taylor et al. (J. Appl. Phys. 64 (5)). As noted by the Examiner, unlike others of the pending claims, these claims previously did not contain a step of adhesion, and therefore the processes previously described by these claims were not necessarily restricted for use as a pretreatment for a subsequent adhesive. However, rejection of claim 10 on this basis is now moot in light of applicants' amendment of claim 10 to include the step of "applying an adhesive to the surface of the substrate after formation of the structures." The same reasoning applies to claims 11, 13 and 16, which depend from claim 10. Because Taylor et al. does not disclose "applying an adhesive to the surface," Taylor et al. does not anticipate any of these claims.

Similarly, claims 10-11, 13 and 16 stand rejected under 35 U.S.C. §102(e) as being anticipated by Brennen et al. (U.S. Patent Publication No. 2005/0242059 \equiv U.S. Patent No. 6,919,162). However, the Examiner acknowledges that the invention set forth in Brennen et al. does not explicitly relate to the usage of promoting adhesion (OA, p. 10). Therefore, in light of the amendment of claim 10 to include the step of "applying an adhesive to the surface of the substrate after formation of the structures," Brennen et al. cannot anticipate claim 10 or its dependent claims 11, 13 and 16.

Page 17 - RESPONSE TO OFFICE ACTION
Serial No. 10/052,815
HP Docket No. 10012053-1
KH Docket No. HPCC 321

Similarly, claims 10-11, 13 and 16 stand rejected under 35 U.S.C. §102(e) as being anticipated by Burns et al. (U.S. Patent No. 5,172,473). However, as in the cases of Taylor et al. and Brennen et al. above, Burns et al. fails to disclose laser ablation for promoting adhesion of a surface, but rather discloses laser roughening for forming an electrical contact. Therefore, in light of the amendment of claim 10 to include the step of "applying an adhesive to the surface of the substrate after formation of the structures," Burns et al. also cannot anticipate claim 10 or its dependent claims 11, 13 and 16.

Rejections Under 35 U.S.C. §103

Claims 15 and 36 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Taylor et al. Applicants understand that the basis of these rejections is similar to the Examiner's basis for rejecting claims 10-11, 13 and 16 as anticipated by Taylor et al. under 35 U.S.C. §102(b), except that Taylor et al. does not explicitly disclose forming a substrate from a liquid crystal polymer as claim 15 requires, nor does Taylor et al. disclose forming structures on the surface of the substrate with heights approximately between two and five microns as claim 36 requires. However, claims 15 and 36 both depend from claim 10, which as described above has now been amended to include the step of "applying an adhesive to the surface of the substrate after formation of the structures." Therefore, to the extent that the rejections of claims 15 and 36 rely on anticipation by Taylor et al. of claim 10 prior to its current amendment, the rejections are no longer proper.

Page 18 - RESPONSE TO OFFICE ACTION
Serial No. 10/052,815
HP Docket No. 10012053-1
KH Docket No. HPCC 321

With regard to the new feature recited in claim 10 of applying an adhesive, "[o]bviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so. *MPEP* §2143.01 (citing *In re Kahn*, 441 F.3d 977, 986; 78 USPQ2d 1329, 1335 (Fed. Cir. 2006)). Furthermore, "[t]he level of skill in the art cannot be relied upon to provide the suggestion to combine references." *Id.* (citing *AI-Site Corp. v. VSI Int'l Inc.*, 174 F.3d 1308; 50 USPQ2d 1161 (Fed. Cir. 1999)). As described below, Taylor et al. offers no motivation for modifying its teachings to include application of an adhesive to an ablated substrate, and in fact teaches away from such a modification.

More specifically, Taylor et al. indicates only that debris cones may be *undesirably* formed during laser ablation of a substrate, noting that such debris formation may be eliminated by increasing laser fluence. "[H]igher fluences are required to totally remove the cone formation from large diameter cuts" (Taylor et al., p. 2817). Taylor et al. thus specifically seeks to identify a mechanism for *avoiding* settling of ablation debris on a substrate to form cones, and therefore teaches away from forming cones for any beneficial purpose, including promoting adhesion of the substrate. Because Taylor et al. does not disclose the step of applying an adhesive to an ablated surface, does not offer any teaching, suggestion or motivation to modify its teachings to include that feature, and teaches away from retaining cones for beneficial purposes, rejection of claims 15 and 36 based solely on Taylor et al. is improper.

Page 19 - RESPONSE TO OFFICE ACTION
Serial No. 10/052,815
HP Docket No. 10012053-1
KH Docket No. HPCC 321

Claims 1-5, 7-8, 10-16, 18-20, 33 and 36 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Brennen et al., optionally in view of Taylor et al. The Examiner acknowledges that Brennen et al. does not explicitly discuss deposition of ablation debris material to shadow a portion of a surface and form structures such as cones (OA, p. 10). However, the Examiner states that "it may be considered inherent in the cone formation process with the control fluences as discussed." Applicants respectfully disagree. For a feature to be inherent, "the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.'" *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999) (citations omitted); see also *MPEP* §2163.07(a). In this case, as will be described in more detail below, cone formation specifically due to shadowing by ablation debris is not necessarily present in the cone formation process described by Brennen et al., and in fact to the extent that Brennen et al. suggests a mechanism for its cone formation, it teaches away from shadowing by ablation debris.

More specifically, in the present case, the Examiner points out that Brennen et al. discusses texturing substrates via laser ablation, including controlling laser fluence to affect the amount of ablation (for example, at '059, paragraph [0058]). However, neither deposition of ablated debris material nor resulting formation of cone initiators in the sense of applicants' claims is inherent in the disclosure of Brennen et al., because

Page 20 - RESPONSE TO OFFICE ACTION
Serial No. 10/052,815
HP Docket No. 10012053-1
KH Docket No. HPCC 321

neither is necessarily present in the texturing described by Brennen et al. At [0095], for example, Brennen et al. discloses ablating polymer material "to achieve rapid ejection of ablated material with essentially no heating of the surrounding material." Such rapid ejection does not necessarily imply resettling of the ablation debris onto the surface, and the emphasis within Brennen et al. on the use of extrinsic masks to effect surface texturing suggests that such masks may be necessary to produce surface texturing because the ablated material does not in fact resettle. This could occur, for example, if the surface of the substrate is ventilated to cool the surface or specifically to remove the debris, or if the laser is pulsed sufficiently rapidly that debris is continually reheated and ejected before it resettles on the surface, among other reasons.

The Examiner notes, and applicants acknowledge, that Brennen et al. discusses formation of "cones" near the ablation threshold of the substrate ('059, [0126-0133]). However, the mere use of the term "cones" in Brennen et al. does not indicate formation of cones from shadowing by ablation debris in the sense of applicants' claims, for at least the same reasons as discussed above. As the Examiner notes (OA, p. 11), Brennen et al. cite the 1993 Krajnovich et al. article (73 J. Appl. Phys. 3001) as an example of the same or a similar cone formation process as that described in Example 1 of Brennen et al. Yet the Krajnovich article specifically characterizes its own study as "proving that ablation debris is *not* the initiating factor" in forming the observed cones (abstract, emphasis added). Further, Krajnovich et al. provides a completely different explanation for the observed cones, proposing that "radiation hardening, in the form of carbon enrichment, is responsible for the effects reported" (p. 3006, col. 1). Therefore,

Page 21 - RESPONSE TO OFFICE ACTION
Serial No. 10/052,815
HP Docket No. 10012053-1
KH Docket No. HPCC 321

Krajnovich et al. makes it apparent that the mere presence or formation of cones in a laser ablation process does not imply that the cones were formed as a result of shadowing by ablation debris. More particularly, in light of the possibility—specifically cited by Brennen et al.—that the cones of Brennen et al. were formed by carbon enrichment due to radiation hardening (as proposed by Krajnovich et al.), formation of cones due to shadowing by ablation debris cannot be an inherent feature in the cone formation process described by Brennen et al.

Alternatively, the Examiner states that cone formation via shadowing by ablation debris is obvious over Brennen et al. in view of Taylor et al. Again, applicants respectfully disagree. As noted previously, a prima facie case of obviousness requires some teaching, suggestion, or motivation to combine or modify the teachings of the prior art. *MPEP* §2143.01. As the Examiner acknowledges and as described above, Brennen et al. contains no explicit teaching of cone formation by ablation debris, and the only combination suggested by Brennen et al. stems from its reference to the Krajnovich paper, which proposes that cone formation is due to radiation hardening, and specifically disclaims cone formation due to shadowing by ablation debris. In fact, Krajnovich et al. definitively states that “ablation debris is *not* the initiating factor” in forming the observed cones (abstract, emphasis added), so that by referencing Krajnovich et al., Brennen et al. explicitly teaches away from forming cones by shadowing from resettled ablation debris. Therefore, Brennen et al. does not offer any teaching, suggestion, or motivation to modify its teachings or to combine them with another reference to arrive at cone formation due to shadowing by debris.

Page 22 - RESPONSE TO OFFICE ACTION
Serial No. 10/052,815
HP Docket No. 10012053-1
KH Docket No. HPCC 321

Taylor et al. also fails to provide any motivation for modifying its teachings or combining them with the teachings of Brennen et al. to produce cones by shadowing with ablation debris for the purpose of promoting adhesion. As described previously, Taylor et al. indicates that debris cones may be *undesirably* formed during laser ablation of a substrate, and offers suggestions for how such undesirable debris formation may be eliminated by increasing laser fluence. Taylor et al. thus specifically seeks to identify a mechanism for *avoiding* settling of ablation debris on a substrate, and therefore teaches away from forming cones for any beneficial purpose, including promoting adhesion of the substrate. Accordingly, the proposed combination of Brennen et al. and Taylor et al. is improper in rejecting applicants' claims.

Claims 1-5, 7-8, 10-16 and 18-20 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Burns et al., optionally in view of Taylor et al. Applicants have already presented arguments as to why Taylor et al. fails to suggest cone formation via ablation debris as a mechanism for improving adhesion, and in fact teaches away from such a modification or combination. As to Burns et al., the Examiner states that the previously described "arguments for inherency/obviousness of ablation debris in formation of the cones is [sic] again applicable" (OA, p. 11). However, as applicants have pointed out above with regard to Brennen et al., inherency of a feature requires that the feature necessarily be present in the thing described by the reference, and as described below, deposition of ablated debris material resulting in the formation of cones is not necessarily present in the process described in Burns et al.

Page 23 - RESPONSE TO OFFICE ACTION
Serial No. 10/052,815
HP Docket No. 10012053-1
KH Docket No. HPCC 321

Burns et al. describes that for the purpose of making an electrical contact, "conical projections are formed by excimer laser removal of polymer material through a mask of patterned dots" (col. 4, lines 45-47). A mask specifically disclosed by Burns et al. is described as "Chromium on quartz" (col. 9, line 15). In other words, Burns et al. clearly contemplates placing an extrinsic mask on a substrate to facilitate formation of conical projections. This process in no way necessitates formation of cones due to shadowing by resettled ablation debris, but rather describes formation of cones in regions shadowed by the extrinsic mask. Furthermore, Burns et al. does not describe a process that necessitates settling of ablation debris on the substrate at all. For example, as described previously with regard to the ablation process of Brennen et al., the process of Burns et al. could intentionally or inadvertently remove or otherwise prevent ablation debris from settling, for example by ventilation of the substrate region, or due to the fluence and/or pulsing frequency of the laser being improperly tuned. As pointed out by the Krajnovich paper, even in the absence of an extrinsic mask, cones may form for reasons other than ablation debris.

In summary, Taylor et al. does not disclose applying an adhesive to an ablated substrate, and specifically identifies settling ablation debris on a substrate as undesirable. Therefore, Taylor et al. teaches away from forming cones for the beneficial purpose of promoting adhesion of the substrate. On the other hand, Burns et al. describes only a process that uses an extrinsic mask to form conical structures, and neither settling of ablation debris nor subsequent cone formation is inherent in that process. Furthermore, Burns et al. offers no teaching, suggestion or motivation to form

Page 24 - RESPONSE TO OFFICE ACTION
Serial No. 10/052,815
HP Docket No. 10012053-1
KH Docket No. HPCC 321

cones via shadowing by ablation debris as is described in Taylor et al. Accordingly, the proposed combination of Burns et al. and Taylor et al. is improper in rejecting applicants' claims.

Claims 9, 17, 21, 25-26 and 34-35 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Brennen et al., optionally in view of Taylor et al. as applied to claims 1-5, 7-8, 10-16, 18-20, 33 and 36, and further in view of Murthy et al. (U.S. Patent No. 6,120,131). In addition to the features of the pending claims already described above, these claims also all suggest the specific end use of the substrate within a print cartridge assembly, and the Examiner cites Murthy et al. as disclosing adhesives and polymeric materials within print cartridges. However, as described above, a claim rejection based either on the purported inherency of cone formation due to shadowing by ablation debris in the disclosure of Brennen et al., or based on the combination of Brennen et al. with Taylor et al. to arrive at such cone formation for adhesive purposes, is improper. Therefore, the further combination with Murthy et al. is immaterial, and applicants assert that claims 9, 17, 21, 25-26 and 34-35 are patentable over Brennen et al. and/or over the combination of Brennen et al. with Taylor et al.

Page 25 - RESPONSE TO OFFICE ACTION
Serial No. 10/052,815
HP Docket No. 10012053-1
KH Docket No. HPCC 321

Conclusion

Applicants believe that this application is now in condition for allowance, in view of the above amendments and remarks. Accordingly, applicants respectfully request that the Examiner issue a Notice of Allowability covering the pending claims. If the Examiner has any questions, or if a telephone interview would in any way advance prosecution of the application, please contact the undersigned attorney of record.

Respectfully submitted,

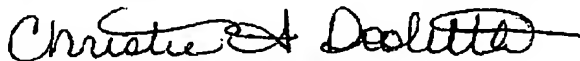
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CERTIFICATE OF FACSIMILE TRANSMISSION

I hereby certify that this correspondence is being facsimile transmitted to Examiner E. Fuller, Group Art Unit 1762, Commissioner for Patents, at facsimile number (571) 273-8300 on November 24, 2006.



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Page 26 - RESPONSE TO OFFICE ACTION
Serial No. 10/052,815
HP Docket No. 10012053-1
KH Docket No. HPCC 321